

Technical Data Sheet

AFM[®] Specification

AFM[®] is a highly engineered product manufactured from a specific glass type, processed to obtain the optimum particle size and shape. It is then exposed to a unique 3-step activation process to become self-sterilising and to acquire superior filtration properties. During activation, the structure and the chemistry of the glass are modified.

AFM Type & Grade

AFM[®]s (Standard) - Negative surface charge

- AFM[®]s Grade 0
- AFM[®]s Grade 1
- AFM[®]s Grade 2
- AFM[®]s Grade 3

AFM[®]ng - Hydrophobic surface

- AFM[®]ng Grade 1
- AFM[®]ng Grade 2
- AFM[®]ng DIN

The particle size distribution is controlled to within very tight tolerances. We control the sphericity and uniformity coefficient of the grains to maximise particle filtration. Through an innovative and proprietary activation process, AFM[®] obtains unique surface properties including negative surface charge or neutral and hydrophobic.

AFM[®] is an advanced, unique manufactured product allowing an optimized particle size distribution and shape which improves filtration performance especially related to superior particle removal efficiency and high filtration velocity.

Particle Size & Specification

| Specification | Grade 0 | Grade 1 | Grade 2 | Grade 3 | DIN | Standard |
|--|--|----------------|----------------|--------------|----------------|---------------|
| Particle size | 0.25 - 0.5 mm | 0.4 - 0.8 mm | 0.7 - 2.0 mm | 2.0 - 4.0 mm | 0.7-1.2mm | ISO 13322-2 |
| Undersized | ≤ 5 % | ≤ 5% | ≤ 10% | ≤ 10% | ≤ 10% | ISO 13322-2 |
| Oversized | ≤ 5 % | ≤ 5% | ≤ 10% | ≤ 10% | ≤ 10% | ISO 13322-2 |
| Effective size (expressed as d10) | 0.26 ± 0.01 mm | 0.41 ± 0.01 mm | 0.78 ± 0.04 mm | 2.3 ± 0.3 mm | 0.79 ± 0.03 mm | ISO 13322-2 |
| Hardness | 5.5 - 7.0 mohs | | | | | ASTM C-730 |
| Sphericity (average range) | 0.77 ± 0.01 | 0.79 ± 0.01 | 0.80 ± 0.01 | 0.81 ± 0.01 | 0.80 ± 0.01 | ISO 13322-2 |
| Uniformity coefficient (d60/d10) | 1.4 - 1.8 | | | | | ISO 13322-2 |
| Roundness | 0.65 - 0.68 | | | | | ISO 13322-2 |
| Aspect ratio | 2.25 ± 0.02 | | | | | |
| Organic contamination | < 50 g/mt | | | | | |
| Coloured glass (green/amber) | > 98 % | | | | | |
| Specific gravity (grain) | 2.4 - 2.52 kg/l | | | | | GTS QP9* |
| Embodied energy kW/1000kg | < 72 | < 65 | < 50 | < 50 | < 50 | |
| Porosity** (%) (calculated, uncompacted) | 50 ± 2 | 46 ± 2 | 43 ± 2 | 42 ± 2 | 45 ± 2 | ASTM D-7263 |
| Porosity** (%) (calculated, compacted) | 40 ± 2 | 38 ± 2 | 37 ± 2 | 37 ± 2 | 37 ± 2 | ASTM D-7263 |
| Uncompacted Bulk bed density | 1.24 kg/l | 1.33 kg/l | 1.40 kg/l | 1.43 kg/l | 1.36 kg/l | EN 12902:1999 |
| Attrition | < 1 % (50 % bed expansion, 100h backwash). | | | | | |
| Product Picture |  | | | | | |

The values given in the table above express the typical range. If required for hydraulic calculations specific values must be stated by the purchaser or must be determined.

* Glass Technology Services, Sheffield, UK procedure QP9 - 'X-ray fluorescence analysis - predictive density measurement'

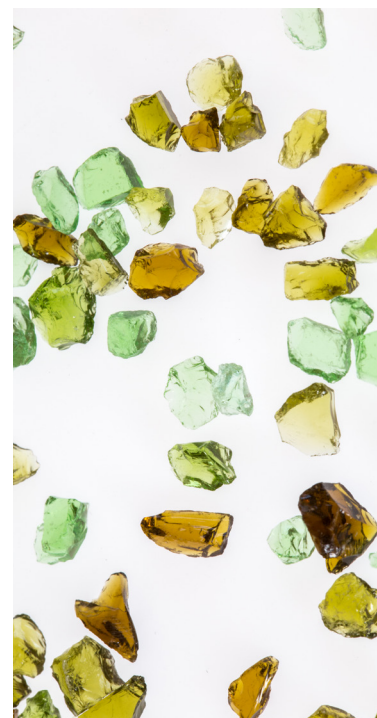
** Porosity - calculated using average bulk density and average particle density

Purity

During the manufacturing process, AFM[®] is exposed on two occasions to temperatures over 500°C (932°F). The product is cleaned and sterilised, and heavy metals and organics are reduced with the target to achieve less than 10 g/t (0.32oz/ton). All production takes place in a secure building, ensuring the product is always protected.

Chemical composition

| Composition (oxides) | Percentage +/- 10% | Composition (oxides) | Percentage +/- 10% |
|----------------------|--------------------|----------------------|--------------------|
| Silica | 72 | Calcium | 11 |
| Magnesium | 2 | Lanthanum | 1 |
| Sodium | 13 | Cobalt | 0.016 |
| Aluminium | 1.5 | Lead | <0.005 |
| Antimony | <0.001 | Mercury | <0.0005 |
| Arsenic | <0.0001 | Titanium | <0.1 |
| Barium | 0.02 | Rubidium | <0.05 |
| Cadmium | <0.0001 | Iridium | <0.05 |
| Chromium | 0.15 | Platinum | <0.0001 |
| Ferric | 0.15 | Manganese | 0.1 |
| Inorganic undefined | <0.0005 | Organic undefined | <0.0005 |



Chemical tolerance

Oxidising agents

AFM® may be exposed to high concentration of oxidising agents:

| | |
|-------------------|---------|
| Free Chlorine | 10 g/l |
| Chlorine dioxide | 10 g/l |
| Ozone | 10 mg/l |
| Hydrogen peroxide | 10 g/l |

Acids and Alkali

AFM® is stable over a wide range of pH conditions, but strong acids and caustic conditions should be avoided:

| | |
|-----------------------|-------------------|
| pH range | pH4 to pH10 |
| Alkali resistance | A1 (ISO 695) |
| Acid resistance | S2 (DIN 12116) |
| Hydrolytic resistance | Class 2 (ISO 720) |

Salinity & TDS

Salinity and high TDS concentrations have no physical or chemical effect on AFM®. AFM® is used for marine applications with up to 40g/l and for some systems up to 165g/l

Temperature

AFM® is not affected by temperature, as long as the water is liquid then AFM® may be used.
Temperature range 0 to 100°C

Chemical resistance

AFM® is chemically resistant to all solvents and hydrocarbons.

Quality and Certification

AFM® is manufactured to a precise specification and ISO certified management control system



AFM is tested and Certified by WQA to NSF/ANSI/CAN 61 and NSF/ANSI/CAN 372 for material requirement(s) only.
Drinking Water Systems Components



UK Drinking Water Inspectorate



Approved for use in Food production



ISO Quality & Environmental Management System



Global leading French Institute for Filtration & Separation Technology testing

AFM® Properties

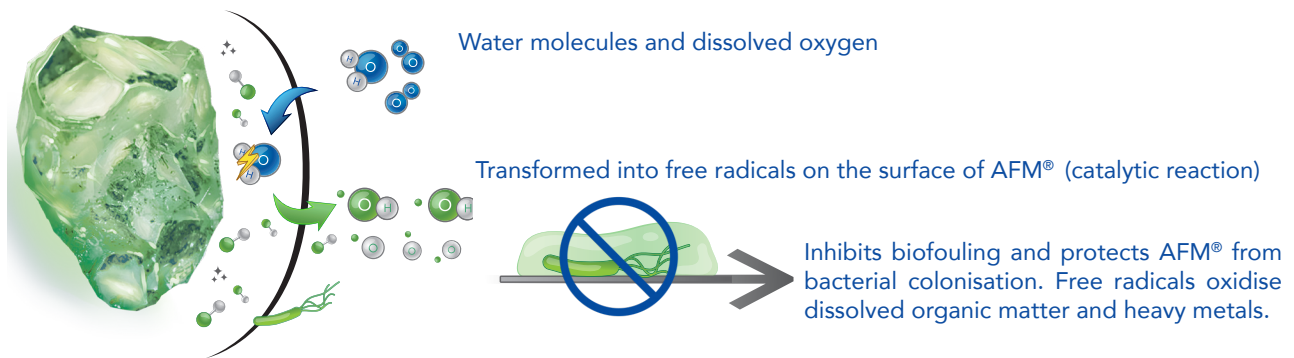
AFM® is an inert, amorphous aluminosilicate (glass) manufactured by up-cycling post-consumer green and brown glass bottles in dedicated, state-of-the-art factories designed and operated specifically for the production of activated glass water filtration media. AFM® is used as filter media in single or dual media filtration in both open (RGF) and closed (pressure) filters for treatment of various sources of water such as ground water, surface water, seawater and waste water treatment.

Description

AFM® particle shape and size distribution are optimised for filtration. AFM® is not a passive filter media, the surface is activated by using a secret formula of chemicals and heat in a SolGel-like process, where the surface structure of each grain of media is altered to control the surface properties:

Surface properties

Self-sterilizing surface resistant to bacterial growth



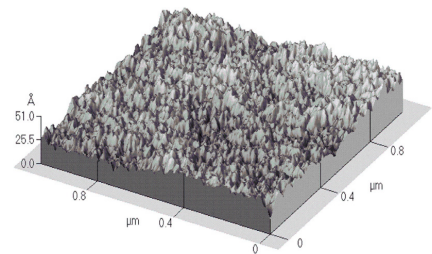
Increased surface area for superior filtration



Large surface area provides for superior mechanical filtration

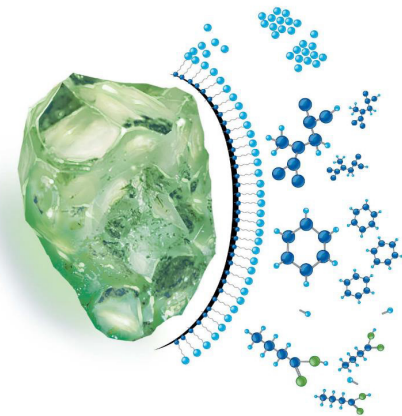
Optimal sphericity, uniformity coefficient, particle size and shape of grain for best hydraulic performance (not round, not flat, no broken bits of glass)

Surface Area by Langmuir Isotherm Method
 1'000kg: AFM = 50.000 m² / Sand = 3.000 m²
 100lb: AFM = 25.000ft² / Sand = 1500ft²



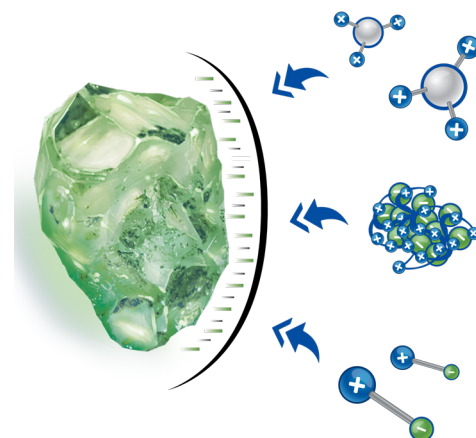
AFM®_{ng}
 Hydrophobic, neutral surface charge

AFM®_s (Standard)
 Negative surface charge



Superior mechanical filtration up to 1µm particles (95% removal)

Adsorption of organic substances including Hydrocarbon and Microplastic



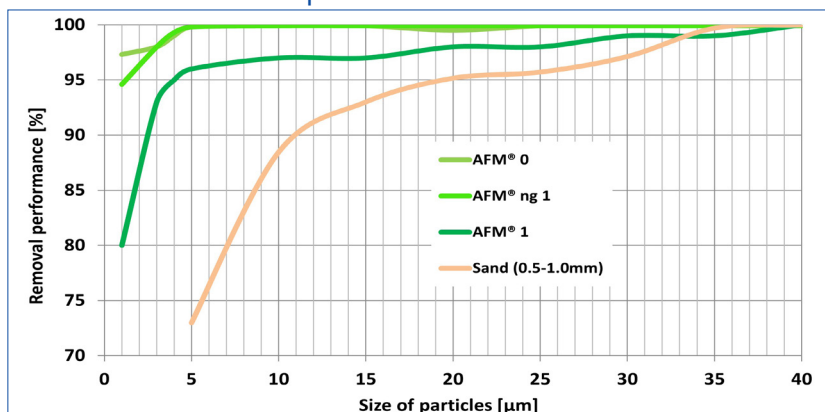
Superior mechanical filtration up to 4µm particles (98% removal)

Adsorption of positively charged particles, flocs and metals (Fe, Mn, As)

AFM® filtration performance

- AFM®-s Grade 0, has a particle size of 0.25 to 0.50mm is used for fine particle removal and/or if backwash velocity is below 30m/h (12.3gpm/ft²).
- AFM®-s (standard) Grade 1 has a particle size 0.4 to 0.8mm is used for heavy metals removal (Fe, Mn, As). It is very efficient in removing positively charged contaminants when water hardness is >50ppm as CaCO₃. Very soft water can lead to reduced filtration performance which is also valid for other filter media such as sand.
- AFM®-ng Grade 1 has a particle size distribution of 0.4 to 0.8mm. It is especially efficient in removing organic contaminants, oils/fats, pharmaceuticals and microplastics in both hard and soft water.
- AFM®-ng DIN has a particle size distribution of 0.7 to 1.2mm. It is made for use in public pools where the DIN grade size is specified,. It is successfully used in selected single media filters in water treatment (e.g. DynaSand® filter) as well as waste water treatment (e.g. tertiary or secondary municipal and industrial waste water effluent).

Particle size removal performance of AFM® vs sand at 20m/hr (8gpm/ft²)



Independent verified by



Guarantee statement

There will be no reduction in performance or AFM® properties when the media is backwashed at a rate that fluidises the bed by a minimum of 20% for a period of 5 minutes or until the water runs clear. AFM® installed on systems 20 years ago is still performing to specification.

Sustainability

- AFM is manufactured from 100% recycled bottle glass from the region.
- The production process is 100% energy and water self-sufficient, using rainwater in a closed-loop filtration system and up to 750,000 kWh self-generated solar power per year.
- Waste (metal, paper, plastic) and non-target product (flint glass, CSP, fines) are separated and recycled or used in other industries. Sludge is responsibly disposed of.
- The life cycle of AFM is many times longer than quartz sand. Many AFM installations will last 20 years and longer.
- When the end of the life cycle of AFM has been reached, we encourage customers to use our simple and cost-effective take-back process, by returning the used AFM in re-useable packaging back to our factories.
- Like recycled bottle glass, the returned AFM will undergo the same process of cleaning and decontamination and will be either re-manufactured into new AFM or -if undersized – it will be recycled or used in other industries.

AFM® packaging, delivery, storage and disposal

AFM® is packaged in a fully automated factory at Green Dot Limited. AFM® is packaged in sealed plastic bags and printed with the appropriate product identification and tracking information.

Packaging & Delivery

AFM® is supplied in bags of the following size:

- 1000 kg (2,200 lb) big bag with bottom discharge on one CP1 pallet (1200 x 1000mm).
- 25 kg (55 lb) plastic bag/40 bags on one CP1 pallet (1200 x 1000mm).
- 21 kg (46 lb) plastic bag/40 or 45 bags per EUR-1 pallet (1200 x 800mm)
- AFM® is delivered in multiples of 1 tonne (2200 lb) pallets, in full truck loads of 24 tonnes (26.4 ton) or in 20ft container loads of 20 tonnes (22 ton)

Bags & Labelling

Each bag is printed during packaging with the following information:

1. Lot batch number
2. Type of AFM®
3. Size Grade
4. Production Date
5. Uniformity coefficient
6. Effective particle size

1 tonne big bag label is attached to each bag providing the same information as the plastic bags

| Product codes | Product order codes | | | | |
|------------------------------------|---------------------------|--------------------------|-------------------------|-------------------------|---------------------|
| | Grade 0 0.25 to 0.50mm | Grade 1 0.40 to 0.8mm | Grade 2 0.7 to 2.0mm | Grade 3 2.0 to 4.0mm | DIN 0.7 to 1.2mm |
| AFM®s 21 kg (46 lbs) bag | 10030 | 10031 | 10032 | 10033 | n/a |
| AFM®ng 21 kg (46 lbs) bag | n/a | 10021 | 10022 | n/a | n/a |
| AFM®s 25 kg (55 lbs) bag | 10000 | 10001 | 10002 | 10003 | n/a |
| AFM®ng 25 kg (55 lbs) bag | n/a | 10005 | 10006 | n/a | 10007 |
| AFM®s 1 tonne (2,200 lbs) big bag | 10010 | 10011 | 10012 | 10013 | n/a |
| AFM®ng 1 tonne (2,200 lbs) big bag | n/a | 10015 | 10016 | n/a | 10017 |

AFM® is supplied in 25 kg (55lb) bags or 1000 kg (2200lb) big bags



40 bags on CP1



24 pallets/truck or 20 pallets/20' FCL



Precautions for safe handling

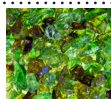
No special precautions should be necessary. Avoid the generation of airborne dust. Provide sufficient ventilation at places where airborne dust is generated and wear a prescribed dust mask. The appropriate precautions as detailed in the SDS data sheet for AFM® must be observed

Conditions for safe storage

Store in a dry place. AFM® may be stored outside. If stored outside it should be protected from the elements by covering with a tarpaulin. Sunlight will not affect AFM®, however the polythene bags may suffer UV damage and the plastic will degrade. Avoid storage outside for long periods of time unless protected from UV radiation.

Disposal of waste and spillage

AFM® normally lasts for the life of the filtration system and has a guaranteed minimum 10 year lifespan. However, if AFM® is removed from the filters due to decommissioning of the filter, it may be recycled at a glass collection site or it may be returned to Green Dot Limited. AFM® is a circular economy product and should ideally not be sent to landfill.



[Learn how AFM® is produced - Take a virtual tour through our factory](#)

